DOCUMENT RESUME

ED 089 253 CS 001 029

AUTHOR McCormick, Claire; Lesgold, Alan M.
TITLE Effects of Imagery Training on Reading Comprehension Ability in Third and Fourth Graders.
PUB DATE Apr 74
NOTE 13p.; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, April, 1974)

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS Grade 3; Grade 4; Learning; *Memory; *Paired Associate Learning; Reading Ability; *Reading Comprehension; *Reading Processes; *Reading Research; Reading Skills

ABSTRACT

This paper reports on one study in a research program trying to extend existing findings on elaborative mediation in paired-associate learning into the domain of prose learning. Ten third graders and 22 fourth graders from an inner-city Catholic school served as subjects. A paraphrase recall pretest was administered which involved reading a three-paragraph, 176-word passage and then retelling it, not necessarily verbatim, from memory. The two groups then received twelve training sessions over a period of 27 days. Two days after the final training session, subjects were given a paraphrase recall test without any imagery prompting, a paraphrase recall test with imagery prompting, and Form G of the Metropolitan Achievement Test (MAT) Elementary Reading battery. The results indicated that there were no differences between groups except on the paraphrase recall test with imagery instruction, where the experimental scores were forty greater than the control scores. (WR)

21.02

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

American Educational Research Association Meeting
Chicago, April, 1974

ED 089253

Effects of Imagery Training on Reading Comprehension Ability in Third and Fourth Graders

Claire McCormick
Alan M. Lesgold

Learning Research and Development Center
University of Pittsburgh

This paper reports on one study in a research program trying to extend existing findings on elaborative mediation in paired-associate learning to the domain of prose learning.

Both Rohwer and Levin have been active in establishing the basic patterns of elaborative mediation effects in children of differing ages (cf. Rohwer, in press, and Levin 1974). Extending the imagery studies of Paivio (1971) and Bower (1972) to children, Rohwer found a strong developmental trend in spontaneous use of elaborative mediation in learning paired associates. Children do not show spontaneous, unprompted use of elaborative mediation in paired associate learning until somewhere between their eighth and eleventh years. Children of low socioeconomic background do not even show spontaneous elaboration by age eleven. On the other hand, by age six or seven most children will use elaboration techniques for remembering paired associates if prompted. They can even do this earlier if motor responses are part of the elaboration (Varley, Levin, Severson, and Wolff, in press).

In a series of studies concurrent with this one, Lesgold, Curtis, DeGood, Golinkoff, McCormick, and Shimron (in preparation) have shown a developmental trend for prompted elaborative effects on prose comprehension

CS 001 029

that is similar to Rohwer's pattern for spontaneous paired-associate elaboration. Specifically, six-year-olds are hampered by imagery instructions (in listening comprehension) while nine-year-olds show no effects of such instructions (on reading comprehension) and adults show a facilitative effect. In this study, we wanted to find out if training the nine-year-olds in elaboration would make it possible for them to show improved comprehension performance if given imagery instructions.

We define the process of elaboration and the criterion for judging comprehension in particular ways. These definitions are arbitrary, and those who wish to debate the "real" boundaries of imagery and "pure" comprehension are likely to challenge our operational definitions of these processes. We welcome suggestions for better labels for the interesting phenomena we study. For the time being, however, we will claim that comprehension is measured by a paraphrase recall task and that elaboration means having in mind a specific event or scene corresponding to the context of that portion of a passage that one is currently reading (or hearing).

Our paraphrase recall tasks involve self-paced reading (hearing, for six-year-olds)of a relatively easy passage and then attempting to retell it from memory, using one's own wording as desired. We analyze the criterial passages in advance for their propositional (predicational) content (cf. Lesgold, et. al., in preparation). Each recall protocol is then judged for the presence or absence of each proposition of the passage. The recall score is the proportion of propositions recalled out of the total number in the passage. Inter-judge reliability is always greater than 80% and usually greater than 90% on individual propositions and close to 100 percent for total recall scores.

The training procedure

The goal of the imagery training procedure in this study was to teach children to draw stick figure cartoon sequences that accurately and completely expressed the general and specific content of text passages. The treatment was specifically designed to teach the twelve skills listed in Table 1. In most sessions, the child read short passages and then performed various cartoon drawing tasks. The passages were selected to be of easy vocabulary for third-graders, to have the vocabulary and syntax of oral speech, to present one or more events involving picturable objects and characters, and to have little or no dialogue.

The twelve training sessions spanned a four weeks period (summarized in Table 2). Initially, we gave the children short one-paragraph stories to read. The child illustrated each story on a cartoon sheet containing six large blank squares. The first instruction included a demonstration of how to quickly draw simple stick figures. The children were told to pick out the main characters and the main events. The trainer praised good renditions of the story and pointed out the good features in the pictures to the other members of the group. At each session, more demanding criteria for the drawings were introduced. The children were directed at successive sessions to discriminate picturable from non-picturable detail, to tell longer and longer stories they had read and illustrated using only their drawings as cues, to segment their pictures so that each sentence was specifically illustrated, and to segment their pictures so that a single scene represented each paragraph. Finally, at the last session, the children practiced the criterion behavior of reading a story with prior imagery instructions and then telling the

story without actually drawing pictures of it.

During the training periods, the control group read the same stories but answered multiple-choice questions about the story. The session included correcting these questions giving each child immediate feedback on what he/she answered correctly and incorrectly. Table 3 gives more details on the control sessions.

Method and Results

Our experimental strategy was to control both groups on grade, sex, and mean total reading score on the Elementary Reading Form F of the Metropolitan Achievement Tests. Thirty-two children (10 third graders and 22 fourth graders; 20 girls and 12 boys) from an innercity Catholic school participated. Their mean pretest scores are shown in Table 4. The paraphrase recall pretest involved reading a three paragraph, 176-word passage and then retelling it, not necessarily verbatim, from memory.

The two groups then received twelve training sessions (imagery or control) over a period of 27 days, as described in Tables 2 and 3. Each session involved both groups reading the same stories, but the imagery group tended to take longer--minutes versus 15 minutes--for an average session. (A current replication eliminates this problem by giving extra stories to the control group. The same basic pattern of results obtains in that replication, according to our preliminary analyses, as in the present study.)

On the two days after the final training session, subjects were given (a) a paraphrase recall test without any imagery prompting (just as in the pretest), (b) a paraphrase recall test with imagery prompting (i.e., subjects were told that having an image of what they read as they read it would help recall), and (c) Form G of the MAT Elementary Reading batttery.

The paraphrase recall passages were approximately, but not exactly, equal in difficulty. Therefore, comparisons are possible only between groups for a particular test. As you can see from Table 4, there are no differences between conditions except on the paraphrase recall test with imagery instructions, where the experimental scores are 40 greater than the control scores, on average.

Comments

Thus, with training, nine-year-old children achieve an elaborative mediation ability in prose learning but do not achieve spontaneous production ability. Perhaps with more training the experimental group would have shown better paraphrase recall even without prompting. (Incidentally, the replication just referred to counterbalances use of three different passages over the three paraphrase recall tests and finds that performance remains constant over the three tests for the control group but shows an improvement on the imagery-prompted posttest for the experimental group. This confirms the results reported here and eliminates the possibility ofworse performance on the posttest than on the pretest.)

Does our treatment improve reading? Our failure to affect MAT performance might seem to say "no." However, recent work by Tuinman (1974) shows that little of the MAT score is a direct test of passage reading and remembering ability. There are 45 questions on the MAT. Thus, a score of 11.25 is possible on average by just randomly marking the answer sheet. Tuinman gave subjects the questions, but not the texts, and boosted performance another 11.02 points over chance. Subjects who also had the texts for the items scored on average only 7.27 points higher than the no text group. Thus, only 25% of the average score is due to

factors other than chance and general verbal test-taking skill. Our null result, then, is disappointing, but not surprising.

We do affect paraphrase recall, the ability to reconstruct the information, which is an important useful skill. Recall depends primarily upon organization, upon the existence not only of memory for the individual idea units of text but also for interidea relationships. We propose that many of those relationships are stored as associations between the general context of a portion of the story and the specific facts related to that context.

We think that imagery instructions to adults and trained children prompt them to devote more effort (in the attentional sense of Kahneman, 1973) to maintenance of a working memory representation of context or foreground (Chafe, 1972). As a person processes each proposition of a text, he understands and remembers it relative to this context. Text is organized in memory according to the extent to which each proposition is related (associated) to its place in the basic story line. When an incomplete model of the basic story line is all that the stuject has in his working memory, then organization, and consequently retrieval, will be incomplete.

In this foreground or context representation imaginal in nature? We do not know for sure. However, we have gotten similar results with verbal summary instructions as with instructions to keep in mind a general picture of what is going on in the passage. Consequently, we suspect that our program of research is looking at the development of attention to context as an understanding and remembering skill. For many readers, that context may feel imaginal--indeed, it may even be imaginal in nature. However, that probably is not why attention to context helps.

References

Bower, G. H. Mental imagery and associative learning. In. L. W. Gregg (Ed.), Cognition in learning and memory. New York: Wiley, 1972.

Chafe. W. L. Discourse structure and human knowledge. In J. B. Carroll and R. O. Freedle (Eds.), Language comprehension and the acquisition of knowledge. Washington, D.C.: Winston, 1972.

Kahneman, D. Attention and effort. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Lesgold, A. M., Curtis, M. E., De Good, H., Golinkoff, R. M., McCormick, C., and Shimron, J. The role of mental imagery in text comprehension. I. Preliminary studies. Pittsburgh: University of Pittsburgh, Learning Research and Development Center, 1974 (in preparation).

Levin, J. R. What have we learned about maximizing what children learn? Madison: University of Wisconsin, Research and Development Center for Cognitive Learning, 1974.

Paivio, A. U. Imagery and verbal processes. New York: Holt, Rinehart and Winston, 1971.

Rohwer, W. D., Jr. Elaboration and learning in childhood and adolescence. In H. W. Reese (Ed.), Advances in child development and behavior. New York: Academic Press, in press.

Varley, W. H., Levin, J. R., Severson, R. A., and Wolff, P. Training imagery production in young children through motor involvement. Journal of Educational Psychology, in press.

Table 1

General Training Objectives

1. Drawing of stick figures.
2. Segmenting stories into separate, picturable scenes.
3. Discriminating main events from details.
4. Discriminating picturable predications from nonpicturable ones.
5. Relating each sentence in the story to a portion of a picture.
6. Relating each paragraph in the story to a portion of the picture series.
7. Relating each picture to a portion of the story.
8. Gaining an approximate one-to-one correspondence between paragraphs of the story and pictures in the series.
9. Using pictures to recall the main events of the story.
10. Using pictures to recall the details of the story.
11. Using codes on pictures to cue recall of unpicturable propositions.
12. Substituting imagery for actual pictures in the above objectives.

Table 2

Summary of Experimental Training Procedure

Day	No. of Stories	Paragraphs per story	Activities
1			MAT Pretest
23			Paraphrase recall pretest
24	2	1	Subjects read first story and are shown cartoon strip E has drawn. Fast, stick figures emphasized. Teacher points out relevant scenes in sample story and Ss draw their own version of each scene in turn. Emphasis on illustrating story, not Ss' fantasies. Subjects then read and illustrate another story.
28	2	1	Subjects read and illustrate both stories. Experimenter checks pictures for accuracy, detail, and order of events. Emphasis on something in cartoon for each sentence of story.
35	2	2	Same as previous session plus emphasis on what in picture corresponds to each paragraph, and how many scenes story contains. Call on one child to tell story from his picture.
36	2	2	Same as previous session with emphasis on close correspondence between pictures and story. In addition, Ss are told to mark pictures to show points where unpicturable statements occurred in story.
37	1	2	Same as previous day.
38	1	3	Same as previous day.
39	1	5	Same as previous day, but each S tells story from his pictures. Emphasis on recalling all details; feedback on recall ability.
42	1	3	Summary to S of skills he has learned. Each child gets a different story. Otherwise, same as previous day.

Table 2

(Con't)

Day	No. of Stories	Paragraphs per story	Activities
44	1	3	Same as previous day.
45	1	5	Same as previous day.
46	1	5	All get same story. Each S tells story from his cartoon. Then cartoons are compared frame by frame.
50	1	5	Subjects told to have images instead of drawing. Each child tells story, then draws his images as cartoon. Subjects told of forthcoming tests and that training sessions will help.
51			Paraphrase recall posttests.
52			MAT posttest.

Table 3

Summary of Control Training Procedure

Day	No. of Stories	Paragraphs per story	Activities
1			MAT Pretest.
2			Paraphrase recall pretest.
24	2	1	Subjects read first story and are asked multiple-choice questions and shown how to mark answers. Then Ss read another story and answer questions, which are checked.
28	2	1	Subjects read stories and answer questions on paper. Then questions discussed orally. Emphasis on accuracy.
35	2	2	Same as previous day. Subjects told that this procedure will improve their ability to remember what they read, i.e., if you can read well enough to answer questions, you can read well enough to recall whole story.
36	2	2	Same as previous day.
37	2	2	Same as previous day.
38	2	3	Same as previous day.
39	2	5	Same as previous day.
42	1	3	Same as previous day, but each child gets his own story.
44	1	3	Same as previous day.
45	1	5	Same as previous day.
46	1	5	Same as previous day, but one story for all.

Table 3

(Con't)

Day	No. of Stories	Paragraphs per story	Activities
50	1	5	Same as before, but separate story for each child. Subjects told of forthcoming tests and told that their training sessions have helped them prepare for it.
51			Paraphrase recall posttest.
52			MAT Posttest.

Table 4

Means on Pre- and Posttests

(Standard deviations in parentheses)

Condition	N	Pretests		Posttests		
		MAT	Paraphrase	MAT	Paraphrase	Paraphrase with imagery instructions
Control	16	64.2(11.1)	0.30(0.12)	65.0(12.2)	0.21(0.17)	0.31(0.19)
Experimental	16	64.2(8.4)	0.31(0.09)	65.1(8.3)	0.25(0.17)	0.44(0.11)